



Sunoco Inc.
100 Green Street
PO Box 426
Marcus Hook PA 19061

CERTIFIED MAIL RETURN RECEIPT: 7008 1300 0002 0946 5483

July 30, 2010

Director, Air Enforcement Division
Office of Civil Enforcement
U. S. Environmental Protection Agency
Mail Code 2242-A
1200 Pennsylvania Avenue, N. W.
Washington, DC 20460-0001

RE: USA v. Sunoco, Inc. et. al. – Civil Action No. 05 CV-02866
9th Semi-Annual Progress Report
January 1, 2010 to June 30, 2010

Dear Sirs:

Pursuant to Paragraph #114 of the Consent Decree entered in the above noted Civil Action, enclosed is Sunoco's Ninth Semi-Annual Progress Report.

Should you have any questions concerning the enclosed report, please contact me at 610-859-1695.

I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my directions and my inquiry of the person(s) who manage the system, or the person(s) directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete.

Signed: Terry A. Soule Date: 7/29/10
Terry A. Soule
Director, Environmental Services & Policy
Sunoco, Inc.

Sincerely,

Terry A. Soule
Terry A. Soule
Director, Environmental Services & Policy
Sunoco, Inc.

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File: Global Settlement Periodic Reports, 2010

cc: Chief, Environmental Enforcement Section
U. S. Department of Justice
Certified Receipt: 7008 1300 0002 0946 5490

Director, Air Enforcement Division
c/o Matrix New World Engineering
Certified Receipt: 7008 1300 0002 0946 5506

U. S. EPA Region III
Certified Receipt: 7008 1300 0002 0946 5513

Pennsylvania Department of Environmental Protection
Mr. James Rebarchak, Air Program Manager
Southeast Regional Office
Certified Receipt: 7006 0810 0002 4549 2426

Oklahoma Department of Environmental Quality
Certified Receipt: 7006 0810 0002 4572 0055

Philadelphia Air Management Service
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U.S. EPA Region V
Certified Receipt: 7008 1300 0002 0946 5599

Ohio Environmental Protection Agency
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Sunoco Facility: Marcus Hook
Report Title: Semi-Annual Consent Decree Compliance Report #9
Reporting Period: 1/1/10 – 6/30/10

Paragraph 114 Reporting and Recordkeeping of Affirmative Relief / Environmental Projects and Emission Data in Section V with Certification

I. Progress Report for Implementation of (section V) Affirmative Relief/Environmental Projects

A. NO_x Emissions Reductions from the FCCU

Engineering design work for Marcus Hook is progressing.

B. SO₂ Emissions Reductions from the FCCU

Engineering design work for Marcus Hook is progressing.

C. Control of PM Emissions from FCCU

Paragraph 16 – Marcus Hook has been compliant with the 1.0 lbs/1000 lbs of coke burn PM requirement as demonstrated in July 2009 using a Method 5 test. A Method 5 stack test for PM was completed on June 29, 2010 but the results are pending.

D. Control of CO Emissions from FCCU

Paragraph 19 – Marcus Hook Refinery is compliant with the requirements of this paragraph. There were deviations to the one hour CO standard that resulted from Malfunctions.

E. NSPS Subparts A and J Applicability at FCCU Regenerators

Paragraph 25 – Marcus Hook is compliant with Subparts A & J. There were deviations to the opacity standard during the reporting period that resulted from Malfunctions.

F. NO_x Emission Reductions from Heaters and Boilers

Paragraph 31 – A final NO_x Control Plan was submitted to EPA and the Appropriate Plaintiffs/Intervenors on 06/14/2010.

G. SO₂ Emissions Reductions from and NSPS Applicability for Heaters and Boilers

Paragraph 37 – No changes have been made since the last progress report.

I. Sulfur Recovery Plants - NSPS Applicability

Marcus Hook is compliant with Subpart J for Sulfur Plant/Tailgas Units.

J. Hydrocarbon Flaring Devices

Paragraph 48 – Alternative Monitoring Protocols (“AMPs”) for the 10 Plant and 12 Plant Flares were submitted to EPA on November 12, 2008 and implemented beginning January 1, 2009. The AMPs were approved by the EPA on May 19, 2009. An AMP for the Ethylene Complex flare is pending, but will be submitted for EPA approval to meet the December 31, 2010 requirement.

K. Control of Acid Gas Flaring and Tail Gas Incidents

Paragraphs 52 & 53 – Sunoco had no Acid Gas or Tail Gas incidents during this reporting period.

L. Control of Hydrocarbon Flaring Incidents

Paragraph 64 – Marcus Hook had two Hydrocarbon Flaring incidents during this reporting period. The incidents occurred on May 22 and May 25, 2010; the Root Cause Failure Analysis investigation reports are attached in Appendices I and II.

The Marcus Hook RCFA included in the Semi-Annual Progress Report submitted July 31, 2009 had one corrective action due to be completed at the next FCCU turnaround. That corrective action was completed during the March 2010 turnaround.

M. Benzene Waste NESHAP Program Enhancements

Paragraphs 65-77

- 1. The BWON exempted quantity was calculated to be 0.0856 MG for the first quarter and 0.0827 MG for the second quarter of 2010. The 2010 annual BWON exempted quantity is predicted to be 0.337 MG. There was no EOL sampling data generated in the reporting period. See Appendix III.**

N. Leak Detection and Repair Program Enhancements

Paragraphs 78-92

- 1. LDAR Monitoring Technician Refresher Training is conducted by Team Inc. on a monthly basis.**

O. Incorporation of Consent Decree Requirements into Federally Enforceable Permit(s)

Paragraphs 93-96: The Marcus Hook Refinery is compliant with the requirements of these paragraphs.

II. Summary of (section V) Emissions Data

Included herein.

III. Description of Any Problems Anticipated with Meeting (section V) Requirements

N/A

IV. Additional Matters to be Brought to the Attention of EPA and the Appropriate Plaintiff/Intervenor

N/A

Paragraph 112 SUPPLEMENTAL AND COMMUNITY ENVIRONMENTAL PROJECTS (SCEP) AND STATE AND LOCAL ENVIRONMENTALLY BENEFICIAL PROJECTS (SLEBP) in Section VIII with Certification

I. Progress Report for Each SCEP or SLEBP (section VIII)

Paragraph 104: In progress

Paragraph 105: Complete

Paragraph 106: Complete

Paragraph 107: Complete

Paragraph 108: Complete

Paragraph 109: Complete

II. Completed SCEP or SLEBP (section VIII)

A. Detailed Description of Each SCEP or SLEBP Project as Implemented

N/A

B. Brief Description of Any Significant Operating Problems Encountered

N/A

C. Certification That Each Project Has Been Fully Implemented Pursuant to the Provisions of this Consent Decree

N/A

D. Description of the Environmental and Public Health Benefits Resulting From Implementation of Each Project (including quantification of the benefits and pollutant reductions, where practicable)

N/A

APPENDIX I

Marcus Hook

Hydrocarbon Flaring Incident – May 22, 2010
Root Cause Failure Analysis



Investigation Report for Acid Gas Flaring or Hydrocarbon Flaring Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	6/14/10	Incident Type: (Check one) <input type="checkbox"/> Acid Gas Flaring: <input checked="" type="checkbox"/> Hydrocarbon Flaring:	
Date(s) of Incident:	(Beginning) 05/22/10 (End) 05/23/10	Flaring start/end time:	from 2:08 PM 05/22/10 to 1:20 PM 05/23/10
Amount of SO_2 Released:	10 plant flare 27587 lbs Pounds <input checked="" type="checkbox"/> Tons <input type="checkbox"/>	Location at the Marcus Hook Refinery:	12-3 Flare <input type="checkbox"/> 10-4 Flare <input checked="" type="checkbox"/> EC Flare <input type="checkbox"/>
<p>Incident Description: Fluid Catalytic Cracking Unit (FCC) Wet Gases are processed via a compressor that is called the #1 Clark Compressor. During a startup of the FCC unit on 05/22/10 the #1 Clark developed a lube oil leak in the outboard oil seal on the steam turbine that drives the compressor. The lube oil leakage was enough that the lube oil level in the steam turbine could not be maintained. It was decided to proactively fix the lube oil leak in a planned mode instead of risking an automatic shutdown of the steam turbine due to lube oil level. To mitigate the flaring; the FCC unit charge was lowered to the minimum sustainable, also maintenance technicians were staffed and worked 24 hrs (through the night) until the compressor was back on line.</p>			
<p>Root Cause of Incident: Root cause was a lube oil leak on the outboard seal of the bearing housing on the steam turbine driver of the Clark Compressor. There was no history of seal leaks prior to this incident. That steam turbine had run from 2004 until March of 2010 (2 months prior to the incident) with no issues. In March of 2010, during our General Refinery Turnaround, the steam turbine went through an extensive rebuild at an outside shop that specializes in heavy equipment. On return from the shop, the steam turbine ran within the normal ranges. That steam turbine is equipped with vibration instrumentation and during the start up and running of the turbine vibrations readings were at acceptable levels.</p>			
<p>Contributing Causes of Incident: None</p>			

Preventive Actions (Actions to reduce likelihood of Recurrence): The Steam Turbine was removed from service, and the leaking oil seal was replaced (completed 5/23/10).

Do Stipulated Penalties Apply? (Acid Gas Flare Only) YES ☐ NO ☒

If YES explain:

- ☐ Yes ☐ No Error resulting from careless operation
☐ Yes ☐ No Failure to follow written procedures
☐ Yes ☐ No Failure of equipment due to failure by Sunoco to operate and maintain equipment in a manner consistent with good engineering practices
☐ Yes ☐ No SO₂ rate greater than 20 lbs/hour continuously for 3 hours or more where Sunoco did not follow PMO plan and took no action to limit duration and/or quantity of SO₂ emissions
☐ Yes ☐ No Acid gas incidents more than 5 in rolling 12 months

Hydrocarbon incident - non acid gas flaring.

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐ Completed: ☒ Not Completed: ☐ Explain:
 All corrective actions completed.

Approval Section

Title	Print Name	Date
Environmental Engineer:	Paul J. Braun	06/14/10
Environmental Lead:	Roger Lanouette	06/14/10
Operations Manager:	Scott Stebbins	06/14/10

Date of Report:	05/23/10	Incident Type: (check one)	Acid Gas Flaring: <input type="checkbox"/>
			Hydrocarbon Flaring <input checked="" type="checkbox"/>

Calculation of Quantity of SO₂ Released from Acid Gas Flaring (Round to the nearest 0.1 Tons):
 Tons of SO₂ = [FR][TD][ConcH₂S][8.44x10⁻⁵] (See p. 52 of 114 CD)
 FR = Average Flow Rate of Gas During Flaring Incident in scfh
 TD = Total Duration of Flaring Incident in hours
 ConcH₂S = Average Concentration of Hydrogen Sulfide in gas during flaring incident
 8.44x10⁻⁵ = [lb mole H₂S/379 scf H₂S][64 lbs SO₂/lb mole H₂S][1 Ton/2000 lbs]

Reason for any missing data: No missing data
 Basis for any data that was estimated:

Tons of SO₂ = 10 plant flare (non acid gas) = 1392 minutes/60 minutes/hr * 18.579 moles per hour of SO₂ (average) * 64 lbs/mole = 27587 lbs SO₂.

Rate of SO₂ Emissions During Acid Gas Flaring: ER = [FR][ConcH₂S][0.169]
 ER = Emission Rate in pounds of SO₂ per hour
 FR = Average Flow Rate of Gas During Flaring Incident in scfh
 ConcH₂S = Average Concentration of Hydrogen Sulfide in gas during flaring incident
 0.169 = [lb mole H₂S/379 scf H₂S][1.0 lb mole SO₂/1 lb mole H₂S][64 lbs SO₂/lb mole SO₂]

Reason for any missing data: none
 Basis for any data that was estimated:

Emission Rate of SO₂ = 1189 lbs/hr

Comments:

None

APPENDIX II

Marcus Hook

Hydrocarbon Flaring Incident – May 25, 2010

Root Cause Failure Analysis



Investigation Report for Acid Gas Flaring or Hydrocarbon Flaring Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	7/8/10	Incident Type: (Check one) <input type="checkbox"/> Acid Gas Flaring: <input checked="" type="checkbox"/> Hydrocarbon Flaring:	
Date(s) of Incident:	(Beginning) 05/25/10 (End) 05/25/10	Flaring start/end time:	from 12:55 PM 05/25/10 to 8:02 PM 05/25/10
Amount of SO_2 Released:	10 plant flare 776 lbs Pounds <input checked="" type="checkbox"/> Tons <input type="checkbox"/>	Location at the Marcus Hook Refinery:	12-3 Flare <input type="checkbox"/> 10-4 Flare <input checked="" type="checkbox"/> EC Flare <input type="checkbox"/>
<p>Incident Description: Fluid Catalytic Cracking Unit (FCC) Wet Gases are processed via a compressor that is called the #1 Clark Compressor. This compressor is driven by a steam turbine (instead of an electric motor). The steam turbine's speed is controlled by an electronic governor. The Governor's purpose is to open and close the steam valve that drives the steam turbine. When the steam valve opens more the steam turbine spins at a higher RPM and the compressor can handle more flow. The governor takes input from the FCC process (compressor suction drum) and determines the appropriate steam turbine speed. On 05/25/10 the positioner on this governor "hung up" (the positioner is part of the instrument that feeds back to the computer on how open the steam valve is). The governor assembly was only 2 months old and had been an upgrade from the previously used governor. Once it was determined that the valve governor position was "hung up" it was decided to replace it. The governor positioner was bypassed and the compressor was manually operated while maintenance replaced the governor positioner (the positioner was a spare part stocked in our warehouse). Almost all the FCC Wet Gas was routed through our normal gas plant however a small amount was flared during the changeover. To mitigate the flaring; the FCC unit charge was lowered to the minimum sustainable, also instrumentation technicians were staffed and worked until completion of the job.</p>			
<p>Root Cause of Incident: Root cause was a failed positioner on the governor assembly of the steam turbine driver of the Clark Compressor. The governor assembly was relatively new (about 2 months) and had been an upgrade.</p>			
<p>Contributing Causes of Incident: None</p>			

Preventive Actions (Actions to reduce likelihood of Recurrence): The failed positioner was changed on the run on 5/25/10).

Do Stipulated Penalties Apply? (Acid Gas Flare Only) YES ☐ NO ☒

If YES explain:

- ☐ Yes ☐ No Error resulting from careless operation
☐ Yes ☐ No Failure to follow written procedures
☐ Yes ☐ No Failure of equipment due to failure by Sunoco to operate and maintain equipment in a manner consistent with good engineering practices
☐ Yes ☐ No SO₂ rate greater than 20 lbs/hour continuously for 3 hours or more where Sunoco did not follow PMO plan and took no action to limit duration and/or quantity of SO₂ emissions
☐ Yes ☐ No Acid gas incidents more than 5 in rolling 12 months

Hydrocarbon incident - non acid gas flaring.

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐ Completed: ☒ Not Completed: ☐ Explain:
All corrective actions completed.

Approval Section

Title	Print Name	Date
Environmental Engineer:	Paul J. Braun	07/08/10
Environmental Lead:	Roger Lanouette	07/08/10
Operations Manager:	Scott Stebbins	07/08/10

Date of Report:	05/25/10	Incident Type: (check one)	Acid Gas Flaring: <input type="checkbox"/>
			Hydrocarbon Flaring <input checked="" type="checkbox"/>

Calculation of Quantity of SO₂ Released from Acid Gas Flaring (Round to the nearest 0.1 Tons):
Tons of SO₂ = [FR][TD][ConcH₂S][8.44x10⁻⁵] (See p. 52 of 114 CD)
FR = Average Flow Rate of Gas During Flaring Incident in scfh
TD = Total Duration of Flaring Incident in hours
ConcH₂S = Average Concentration of Hydrogen Sulfide in gas during flaring incident
8.44x10⁻⁵ = [lb mole H₂S/379 scf H₂S][64 lbs SO₂/lb mole H₂S][1 Ton/2000 lbs]

Reason for any missing data: No missing data
Basis for any data that was estimated:

Tons of SO₂ = 10 plant flare (non acid gas) = 487minutes/60 minutes/hr * 1.494 moles per hour of SO₂ (average) * 64 lbs/mole = 776 lbs SO₂.

Rate of SO₂ Emissions During Acid Gas Flaring: ER = [FR][ConcH₂S][0.169]
ER = Emission Rate in pounds of SO₂ per hour
FR = Average Flow Rate of Gas During Flaring Incident in scfh
ConcH₂S = Average Concentration of Hydrogen Sulfide in gas during flaring incident
0.169 = [lb mole H₂S/379 scf H₂S][1.0 lb mole SO₂/1 lb mole H₂S][64 lbs SO₂/lb mole SO₂]

Reason for any missing data: none
Basis for any data that was estimated:

Emission Rate of SO₂ = 95.6 lbs/hr

Comments:

None

APPENDIX III
Marcus Hook
BWON Projected Year End Quantity

Sunoco Marcus Hook Refinery**2010 Total Benzene Summary**

Unit	2010 1Q Exempt Benzene Total lb	2010 1Q Exempt Benzene Total Mg	2010 2Q Exempt Benzene Total lb	2010 2Q Exempt Benzene Total Mg	2009 3Q Exempt Benzene Total lb	2009 3Q Exempt Benzene Total Mg	2009 4Q Exempt Benzene Total lb	2009 4Q Exempt Benzene Total Mg	<i>Projected Total for Year Mg</i>
Spills	3.55E-05	1.61E-08	0.00	0.00E+00	0.35	1.58E-04	0.00	0.00E+00	<i>1.58E-04</i>
Waste	2.99	1.36E-03	24.70	1.12E-02	17.15	7.78E-03	11.66	5.29E-03	<i>2.56E-02</i>
Dock Pans	185.73	8.42E-02	157.62	7.15E-02	248.29	1.13E-01	162.70	7.38E-02	<i>3.42E-01</i>
Total Quarterly Benzene	204.7	8.56E-02	182.3	8.27E-02	265.8	1.21E-01	174.4	7.91E-02	
PROJECTED Annual Total Exempt Benzene for the year (as of quarter indicated)⁽¹⁾⁽²⁾		3.42E-01		3.37E-01		3.85E-01		3.68E-01	3.68E-01

Sunoco Facility: Philadelphia
Report Title: Semi-annual Consent Decree Compliance Report #9
Reporting Period: 1/1/10 – 6/30/10

Paragraph 114 Reporting and Recordkeeping of Affirmative Relief / Environmental Projects and Emission Data in Section V with Certification

I. Progress Report for Implementation of (section V) Affirmative Relief/Environmental Projects

A. NO_x Emissions Reductions from the FCCU

Paragraphs 12 – 13: There were no NO_x exceedances of the CD limits during the period.

B. SO₂ Emissions Reductions from the FCCU

Paragraphs 14 – 15: The Philadelphia Refinery is compliant with the requirements of these paragraphs. There were no SO₂ exceedances of the CD limits during the period.

C. Control of PM Emissions from FCCU

Paragraph 16 – The Philadelphia Refinery is compliant with the requirements of this paragraph.

D. Control of CO Emissions from FCCU

Paragraph 19 – There were no consent decree CO exceptions noted during the reporting period pursuant to paragraph 19.

Startup, Shutdown and/or Malfunctions:

The 500 ppm CO limit was exceeded for one hour (at 539 ppm) on March 4, 2010 during a malfunction when moisture in the instrument air to the CO Boiler (COB) turbine governor control caused the turbine to slow down and trip the low air flow safety system. The safety trip shut the fuel gas to the COB resulting in the one hour exceedance.

Paragraph 20 – Philadelphia Refinery is compliant with the requirements of this paragraph.

E. NSPS Subparts A and J Applicability at FCCU Regenerators

Paragraphs 24 – 25: There were no Subpart A or J exceptions during the reporting period.

However, On April 14, 2010, there was one permit opacity exception (with more than 3 minutes (4 minutes) over 20% opacity) that occurred when the soot blowers turned on during catalyst unloading. At all times the opacity was below 30% and therefore not a Subpart J opacity exception.

F. NO_x Emission Reductions from Heaters and Boilers

Paragraph 31 – All work has been completed. Requests for permit amendments were submitted to AMS related to the shutdown of No. 38 boiler and to set a limit on the 210 unit H-201 heater. An updated detailed and final NO_x Control Plan was submitted to EPA and the Appropriate Plaintiffs/Intervenors on June 14, 2010.

G. SO₂ Emissions Reductions from and NSPS Applicability for Heaters and Boilers

Paragraphs 36 – 38: There was one three hour rolling average H₂S exceedances at NSPS J regulated heaters as shown below:

On January 2, 2010, a Malfunction at the 1332 unit caused an H₂S spike in the fuel gas resulting in one 3-hr average exceedance of the 162 H₂S ppm limit (165 ppm). Attempts to swing the fuel feed to hydrogen were unsuccessful because of frozen conditions.

I. Sulfur Recovery Plants - NSPS Applicability

Paragraphs 40 – 47: The Philadelphia Refinery is compliant with the requirements of these paragraphs.

J. Hydrocarbon Flaring Devices

Paragraphs 48 – 50: The following is a summary of options the Philadelphia Refinery has elected to comply with regarding the CD NSPS requirements for flares.

Philadelphia Flares	Compliance Status
PB North Yard LPG Flare	NSPS. Have an approved AMP. Please note that a request to revise this approve AMP was submitted to USEPA and approved by them in April, 2010.
PB South Yard North Flare	NSPS. Operating and maintaining a flare gas recovery system.
PB 867 Acid Gas Flare	NSPS. This is not currently a fuel gas combustion device. The purge and pilot gas is comprised of purchased natural gas. When the purge and pilot gas is converted to refinery fuel gas, that gas will be monitored to be compliant with Subpart J. The flare only receives non-

	routinely generated gases, process upset gases, fuel gas released as a result of relief valve leakage or gases released due to other emergency malfunctions.
PB 867 SWS Gas Flare	NSPS. This is not currently a fuel gas combustion device. The purge and pilot gas is comprised of purchased natural gas. When the purge and pilot gas is converted to refinery fuel gas, that gas will be monitored to be compliant with Subpart J. The flare only receives non-routinely generated gases, process upset gases, fuel gas released as a result of relief valve leakage or gases released due to other emergency malfunctions.
GP 1231/1232 Flares	NSPS status planned for 12/31/2010. AMP submitted to EPA for approval in July, 2010.
GP 433 Flare	NSPS status planned for 12/31/2010. AMP submitted to EPA for approval in July, 2010.

As included in the last semi-annual report and as mentioned in Sunoco's December 18, 2009 letter to Mr. James Hagedorn of USEPA, the refinery reviewed the PB North Yard LPG Flare AMP and realized that USEPA's approval of the AMP was inconsistent with Sunoco's January 2006 request. Sunoco had been under the misunderstanding that USEPA approved the requested hydrogen sulfide limit (requested as the monitoring constituent to be consistent with the applicable limit) and had been analyzing for hydrogen sulfide. There have been no instances since the AMP has been in effect where any sample exceeded 20 ppm hydrogen sulfide. However, the approved AMP required checking for total sulfur rather than hydrogen sulfide. During the reporting period, after realizing the discrepancy, we reevaluated the historical samples for total sulfur and discovered that 7 sample results exceeded 20 ppm total sulfur, ranging from 23 to 80 ppm. In Sunoco's December 2009 letter, we requested that USEPA re-evaluate the original approval to change the required monitoring to hydrogen sulfide. This request was approved by USEPA on April 15, 2010.

K. Control of Acid Gas Flaring and Tail Gas Incidents

Paragraphs 51 – 63: Acid gas flaring computational methods have been in place since the DOE. There were no AG flaring events to note for this reporting period.

L. Control of Hydrocarbon Flaring Incidents

Paragraph 64:

There was one Hydrocarbon Flaring Incident during this reporting period associated with the South Yard North Flare. The flaring event occurred on April 17, 2010; a copy of the Root Cause Failure Analysis report is enclosed, see Appendix IV. Also, please note that visible emissions in excess of 5 minutes were evident during this Hydrocarbon Flaring Incident.

Also, the uncompleted work from the Hydrocarbon Flaring Incident that occurred on September 14, 2009 and reported in the last semi-annual report was completed in November, 2009 prior to the anticipated January 31, 2010 planned completion date.

M. Benzene Waste NESHAP Program Enhancements

Paragraphs 65-77

- 1. The following BWON training was conducted over this semi-annual period: (a) Site BWON Coordinator received annual training on sampling and analysis procedures; (b) Three technicians were trained on how to perform Method 21 annual monitoring of vacuum trucks; and (c) One technician was trained on how to perform monitoring of carbon installations.**
- 2. The BWON exempted quantity was calculated to be, based on EOL sampling data, 0.159 MG for the first quarter and 0.013 MG for the second quarter of 2010. The projected 2010 annual BWON exempted quantity, based on EOL sampling is calculated to be 0.34 MG. See Appendix V for EOL sampling results.**

N. Leak Detection and Repair Program Enhancements

Paragraphs 78 – 92: No audits were conducted pursuant to Paragraph 80 during the reporting period.

All corrective actions for audit findings identified in the 2008 LDAR Third Party Compliance Audit have been completed in 2008 and 2009, as reported in the July 2009 Consent Decree Semi-Annual Report.

The third LDAR Third Party Compliance Audit is scheduled to be conducted in October, 2010.

No changes have been made to the program during the reporting period and the required certifications have already been submitted as required in Paragraph 92(b).

Information required under Paragraph 92(c) will be submitted in the first semiannual report of 2011 under 40 CFR 63.654.

O. Incorporation of Consent Decree Requirements into Federally Enforceable Permit(s)

Paragraphs 93 – 96: The Philadelphia Refinery is compliant with the requirements of these paragraphs.

II. Summary of (section V) Emissions Data

Included herein.

III. Description of Any Problems Anticipated with Meeting (section V) Requirements

None

IV. Additional Matters to be Brought to the Attention of EPA and the Appropriate Plaintiff/Intervenor

None

Paragraph 112 SUPPLEMENTAL AND COMMUNITY ENVIRONMENTAL PROJECTS (SCEP) AND STATE AND LOCAL ENVIRONMENTALLY BENEFICIAL PROJECTS (SLEBP) in Section VIII with Certification

I. Progress Report for Each SCEP or SLEBP (section VIII)

Paragraph 104: In progress

Paragraph 105: Complete

Paragraph 106: Complete

Paragraph 107: Complete

Paragraph 108: Complete

Paragraph 109: Complete

II. Completed SCEP or SLEBP (section VIII)

A. Detailed Description of Each SCEP or SLEBP Project as Implemented

None

B. Brief Description of Any Significant Operating Problems Encountered

None

C. Certification That Each Project Has Been Fully Implemented Pursuant to the Provisions of this Consent Decree

If applicable, see the certification behind the cover letter.

D. Description of the Environmental and Public Health Benefits Resulting
From Implementation of Each Project (including quantification of the benefits and
pollutant reductions, where practicable)

N/A

APPENDIX IV
Philadelphia
Hydrocarbon Flaring – April 17, 2010
Root Cause Failure Analysis



Investigation Report for Acid Gas, Sour Water Gas, Tail Gas, or Hydrocarbon Flaring Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	June 1, 2010	Incident Type: (Check one)	<input type="checkbox"/> Acid Gas Flaring:
			<input type="checkbox"/> Tail Gas Flaring:
			<input checked="" type="checkbox"/> Hydrocarbon Flaring:
Date(s) of Incident:	(Beginning) 4/17/2010 (End) 4/17/2010	1 st Flaring start/end time:	(start) 1:30 PM (end) 3:52 PM
		2 st Flaring start/end time:	(start) 7:19 PM (end) 8:20 PM
		3 st Flaring start/end time:	(start) (end)
Amount of SO_2 Released:	1,398 Pounds <input checked="" type="checkbox"/> Tons <input type="checkbox"/>	Location at the Philadelphia Refinery:	SWS Flare <input type="checkbox"/> 1231/2 Flare <input type="checkbox"/> AG Flare <input type="checkbox"/> SY N Flare <input checked="" type="checkbox"/> North Flare <input type="checkbox"/> 433 Flare <input type="checkbox"/>
		862 Light Ends Unit	

Incident Description:

On April 17, 2010 at 1:30 pm, the 1C-101A and 1C-101B Crude Gas compressors at 862 Light Ends Recovery unit shutdown due to a high liquid level in 1V-103 (compressor second stage suction drum). The compressor shutdown caused the crude gas line pressure control valve, 9PC20, to open to the South Yard North Flare. Raw crude gas containing an appreciable amount of H₂S was flared for a total period of 3 hours and 23 minutes resulting in 1,398 lbs of SO₂ excess emissions.

The 1C-101 compressors are equipped with two interlocks that will cut power to the compressor motors; the lube oil pressure switch, and a level switch on either the 1st or 2nd stage suction drums. When the compressors initially tripped at 1:30 pm, operators checked the control board suction drum level instrumentation which was showing normal. Based on this information, the initial response by operations was to confirm that the lube oil pumps were in working order and attempt to restart the compressor. The compressor lube oil was confirmed to be ok, and the compressor was attempted to be restarted. This restart was not successful and at this time 868 FCCU made adjustments to begin pulling in crude gas to reduce the total release to flare. (Each compressor has interlocks built in which limit one immediate start after a power cut-off designed to prevent damage to the motor windings. If a second power cut-off occurs within 30 minutes of the first, it is necessary to wait 1 hr before attempting to start the compressor.)

When operators could not restart the compressor, they began troubleshooting the 1st and 2nd stage suction drums. Each drum is equipped with bottoms pumps controlled by level controllers in the drums. While investigating the 1V-103 suction drum level, operators noticed that the local level glass appeared flooded, however, the 2LC-101 level indication on the board was only showing 3% level in this drum. Once the level instrumentation was confirmed to be reading incorrectly, operations contacted IG personnel for instrument support. Operators manually pumped the level away and were able to get the compressor restarted at 3:52 pm.

The 1C-101A&B compressors operated without issue until 7:19 pm when they unexpectedly tripped again. 9PC20 opened to relieve crude gas line pressure to flare line. 868 FCCU immediately began to take in crude gas to minimize flaring. 1V-103 level was again found to be flooded and the operators manually pumped down the level. IG was present and available to repair and calibrate the 2LC-101 level instrumentation. The compressors were restarted at 7:55 pm and 9PC20 finally closed at 8:20 pm.

Steps taken to limit duration of flaring or quantity of SO₂/Hydrocarbon released (Corrective Actions):

Operators at 868 FCCU made operating adjustments to pull in crude gas that reduced flaring.

Root Cause of Incident:

The root cause of the 1C-101 compressor shutdown was high liquid level in the 2nd stage suction drum, 1V-103, caused by faulty level indication (2LC-101). With the crude gas compressors shut down, the crude gas line pressure builds pressure which is relieved to the flare by 9PC20 safety pressure controller. Once the crude gas line pressure goes above the set point for this controller (26 psig), the controller opens sending raw sour gas to the flare.

Contributing Causes of Incident:

Inadequate warning system design – Level alarm was not engaged due to faulty level indication.

Operators attempted compressor restart before all permissives were investigated and confirmed to be in working order. This resulted in 1 hour compressor timeout due to interlock of two consecutive power cut outs in 30 minutes.

Preventative Actions (Actions to reduce likelihood of Recurrence):

Ensure 2LC-101 level instrumentation is suitable for existing service and replace if necessary. Consider installing new type of local level indication as level glass is often difficult to read due to dirty service. Consider installation of a different level alarm device or preemptive alarm on 1LSH-127.

Confirm operator protocol for 1C-101 compressor troubleshooting and restart are in-line with procedure. Provide information to operations on MultiLyn interlock system for compressor power cut-off and consequences for violating interlocks.

Evaluate compressor interlock and timeout duration to see if 1 hour time out is excessive and if this can be reduced to minimize compressor downtime. Confirm if permissives MUST be satisfied before power can be cut-in or if permissives can still be out of compliance and a power cut-in attempt made which could result in consecutive interlock shutdown and compressor timeout.

Do Stipulated Penalties Apply? (Acid Gas Flaring Only) YES ☐ NO ☒

If YES explain:

- ☐ Yes ☐ No Error resulting from careless operation.
☐ Yes ☐ No Failure to follow written procedures.
☐ Yes ☐ No Failure of equipment due to failure by Sunoco to operate and maintain equipment in a manner consistent with good engineering practices
☐ Yes ☐ No SO₂ rate greater than 20 lbs/hour continuously for 3 hours or more where SUNOCO did not follow PMO plan and took no action to limit duration and/or quantity of SO₂ emissions.
☐ Yes ☐ No More than five acid gas flaring incidents in rolling 12 months period.

If NO explain:

Hydrocarbon Flaring Event

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐ Completed: ☐ Not Completed: ☒ Explain: Instrumentation reviews will be completed by 1/1/2011.

Approval Section		
Title	Print Name	Date
Sr Environmental Engineer:	Glenn Tashjian	June 1, 2010
Environmental Manager:	Chuck D. Barksdale Jr.	June 2, 2010
Operations Manager:	Edward M. Deni	June 11, 2010

Philadelphia Refinery

1. CD Paragraph 77(B)(i)(3) Sampling Results Philadelphia Refinery

Sample Point ID	Sample Date	Benzene Conc (ppmw)	Avg 1st Qtr 2010 Benzene Conc. (ppmw)	Avg 2nd Qtr 2010 Benzene Conc. (ppmw)	1st Qtr 2010 Flow (gal)	2nd Qtr 2010 Flow (gal)	1st Qtr 2010 Benzene Quantity (Megagrams)	2nd Qtr 2010 Benzene Quantity (Megagrams)
210 Box Cooler (PB EOL 001)	01/11/10	0.012	0.007		74235000		0.002	0.0006
	02/15/10	0.00099						
	03/08/10	0.007						
	04/14/10	0.005		0.002		74235000		
	05/10/10	0.00099						
	06/08/10	0.00099						
Klondike Effluent (PB EOL 002)	01/11/10	0.00099	0.02		10000000		0.0008	0.0002
	02/15/10	0.001						
	03/08/10	0.045						
	04/14/10	0.013		0.005		10000000		
	05/10/10	0.00099						
	06/08/10	0.00099						
867 Effluent (PB EOL 003)	01/12/10	0.00099	0.004		22625000		0.0003	0.00008
	02/16/10	0.0099						
	03/09/10	0.00099						
	04/15/10	0.00099		0.00099		22625000		
	05/11/10	0.00099						
	06/09/10	0.00099						
PB Grit Chamber Effluent (PB EOL 004)								

No samples taken this period - not required. Grit chamber samples were only required to be sampled for one quarter and this had already occurred in early 2008.

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Sample Point ID	Sample Date	Benzene Conc (ppmw)	Avg 1 st Qtr 2010 Benzene Conc. (ppmw)	Avg 2 nd Qtr 2010 Benzene Conc. (ppmw)	1st Qtr 2010 Flow (gal)	2 nd Qtr 2010 Flow (gal)	1 st Qtr 2010 Benzene Quantity (Megagrams)	2 nd Qtr 2010 Benzene Quantity (Megagrams)
1232 4 th and M (GP EOL 001)	01/11/10	0.1	0.079		71500000		0.021	0.009
	02/15/10	0.083						
	03/08/10	0.054						
	04/14/10	0.026		0.032		71500000		
	05/10/10	0.041						
	06/08/10	0.028						
231 F Box Discharge (GP EOL 002)	01/12/10	0.13	0.05		3450000		0.0007	0.0005
	02/16/10	0.012						
	03/09/10	0.022						
	04/15/10	0.082		0.04		3450000		
	05/11/10	0.022						
	06/09/10	0.006						
231 Groundwater (GP EOL 003)	01/2010	*No sample	*0		477333		*0	0.0003
	02/2010	*No sample						
	03/2010	*No sample						
	04/2010	*No sample		0.14		477333		
	05/10/10	0.13						
	06/08/10	0.14						
* Groundwater system not operational at the time of sampling.								
#3 Separator Effluent (GP EOL 004)		Pump inop – no sample	0.00099		3150000		0.00001	0.00001
	01/2010							
	02/15/10	0.00099						
	03/09/10	0.00099		0.00099		3150000		
	04/15/10	0.00099						
	05/11/10	0.00099						
	06/09/10	0.00099						

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For the January 2010 sampling event, 30% product (P) and 70% water (W) was observed. For the April 2010 sampling event, 5% product and 95% water was observed. For both months, samples were collected and analyzed for both water and product phases. For all other months during this semi-annual period, 100% water (no product) was observed.

V-4 Hydrobon Separator Condensate Wash (GP Non-EOL 001)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>No waste was generated from this Non-EOL point during the semi-annual period.</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
V-603 Debutanizer Receiver Condensate Wash (GP Non-EOL 002)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
<i>No waste was generated from this Non-EOL point during the semi-annual period.</i>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1st Qtr 2010 EOL Sampling TAB = 0.159 Megagrams

2nd Qtr 2010 EOL Sampling TAB = 0.013 Megagrams

Projected annual 2010 EOL sampling TAB = 0.34 Megagrams

Notes:

- 1. Benzene concentrations listed as 0.00099 ppm were reported by the laboratory as < 0.001 ppm which is the detection limit.*
- 2. Average quarterly benzene concentrations are simply the arithmetic mean of the individual laboratory results for the quarter.*
- 3. Sample calculation of 1st Qtr Benzene Quantity for GP EOL 002:*

1st Qtr avg benzene conc. = 0.05 ppm

1st Qtr flow = 3,450,000 gallons

So:
$$\frac{0.05 \text{ ppm benzene} \times 3,450,000 \text{ gallons} \times 8.34 \text{ lbs/gallon}}{2204.6 \text{ lbs/megagram} \times 1,000,000 \text{ parts per million}} = 0.0007 \text{ Megagrams}$$

Sunoco Facility: Toledo Refinery
Report Title: Semi-annual Consent Decree Compliance Report #9
Reporting Period: 1/1/10 – 6/30/10

Paragraph 114 Reporting and Recordkeeping of Affirmative Relief / Environmental Projects and Emission Data in Section V with Certification

I Progress Report for Implementation of (section V) Affirmative Relief/Environmental Projects

A. NO_x Emissions Reductions from the FCCU

The SCR construction was completed and unit started up in September 2009. NO_x emissions are being monitored as required. Deviations are reported separately in the quarterly and semiannual reports submitted to Ohio EPA.

B. SO₂ Emissions Reductions from the FCCU

Wet Gas Scrubber construction was completed and unit started up in September 2009. SO₂ emissions are being monitored as required. Deviations are reported separately in the quarterly and semiannual reports submitted to Ohio EPA.

C. Control of PM Emissions from FCCU

Wet Gas Scrubber (with particulate control) construction was completed and unit started up in September 2009. Alternative Monitoring plan is in place to monitor particulate removal efficiency. The AMP target values were set during the January 2010 performance testing.

D. Control of CO Emissions from FCCU

The Toledo Refinery is monitoring CO compliance as required. Deviations are reported separately in the quarterly and semiannual reports submitted to Ohio EPA.

E. NSPS Subparts A and J Applicability at FCCU Regenerators

The SCR and Wet Gas Scrubber (with particulate control) construction was completed and units started-up in September 2009. The PTI for the FCC Unit construction specified that NSPS is applicable to the FCCU regenerator.

F. NO_x Emission Reductions from Heaters and Boilers

Paragraph 31 – A final NO_x Control Plan was submitted to EPA and the Appropriate Plaintiffs/Intervenors on 06/14/2010.

G. SO₂ Emissions Reductions from and NSPS Applicability for Heaters and Boilers

Construction of the new SRU and two new Tail Gas Treating Units was completed during the 4th quarter of 2009. Both SRU/TGTU trains were in service by 12/31/2009. The new SRU/TGTU complex includes back up amine treating capability for the fuel gas system during turnarounds of the refinery amine unit.

New fuel gas analyzers were installed and various vents were reconfigured in the refinery fuel gas system during the 4th quarter of 2009. The new analyzers were placed in service in December 2009.

I. Sulfur Recovery Plants - NSPS Applicability

Construction of the SRU and two new tail gas units was completed during the 4th quarter of 2009. Both SRU/TGTU trains were in-service by 12/31/2009. SO₂ emissions are being monitored as required. Deviations are reported separately in the quarterly and semiannual reports submitted to Ohio EPA.

J. Hydrocarbon Flaring Devices

Sunoco received approval from USEPA for its Plant 4 flare Alternative Monitoring Plan in May 2010. The car seals specified in the plan are in place and the refinery is complying with monitoring specified. An exception pursuant to the Plant 4 flare AMP during this reporting period was that the January monthly inspection for four (4) car seals was late. The inspection was completed on February 2 and the valves were found closed as required.

Additionally, in March, the Plant 9 flare was temporarily connected to the Plant 4 flare during the refinery turnaround. During this period, the process units normally connected to the Plant 9 flare were not in operation. However, one small stream remained in service. Data for this stream confirmed that it was less than 159 ppm H₂S.

Also, a hydrocarbon flaring incident occurring between 12/09/09 and 12/12/09 was reported in the previous semiannual report. That 12/09 incident report is included

The Plant 9 flare AMP is under development and a review is ongoing. The approval request will be submitted for EPA approval to meet the December 31, 2010 requirement.

K. Control of Acid Gas Flaring and Tail Gas Incidents

There was one acid gas flaring incident between 01/01/10 and 06/30/10. The report for the 1/15 incident was submitted as required by the CD. Additionally, an acid gas flaring incident that occurred between 12/09/09 and 12/12/09 was reported in the previous semiannual report. That 12/09 incident report is attached at Appendix VIII.

L. Control of Hydrocarbon Flaring Incidents

There were two hydrocarbon flaring incidents for this reporting period. The incidents occurred on April 29, 2010 and May 12, 2010; the Root Cause Failure Analysis investigation reports are attached in Appendices VI and VII. The 12/12/09 incident report was submitted in January 2010 in combination with the acid gas flaring incident report.

M. Benzene Waste NESHAP Program Enhancements

- 1. Required Training on BWON Controls has been implemented through:**
 - **Weekly Safety Topics for Refinery Employees.**
 - **HES Supervisory Training for Management & Supervision.**
 - **CA Training for Contract Administrators.**
 - **Sampling Procedure for BWON Coordinator.**
 - **Computer Based Learning for Refinery Employees.**
- 2. The BWON exempted quantity was calculated for the first (0.13 MG) and second (0.60 MG) quarters of 2010. There was a one-time event that contributed 0.47 MG to the exempt quantity. The projected BWON exempted quantities for 3rd & 4th quarters are expected to be similar to the 1st quarter amount of 0.13 MG. This would give an estimated 2010 BWON exempted quantity of 1.0 MG, which is under the 2 MG exemption.**

N. Leak Detection and Repair Program Enhancements

- 1. Required Training on LDAR has been implemented through:**
 - **Weekly Safety Topics for Refinery Employees.**
 - **CA Training for Contract Administrators.**
 - **LDAR Contractor Training & Exams provided by EA, Inc.**
 - **Sunoco LDAR Conference for LDAR Coordinator.**
 - **Computer Based Learning for Refinery Employees.**
- 2. The LDAR Coordinator for the reporting period is Stephenie Sibberson.**

O. Incorporation of Consent Decree Requirements into Federally Enforceable Permit(s)

An updated Title V permit application that included the CD requirements was submitted to Ohio EPA in accordance with Ohio EPA preferences during the 2nd half of 2006. The Permit to Install for the CD control devices/refinery upgrades also included the CD requirements for emission limits and standards. TDES is in the process of revising the Title V permit for the Toledo refinery.

II. Summary of (section V) Emissions Data

Included herein.

III. Description of Any Problems Anticipated with Meeting (section V) Requirements

None

IV. Additional Matters to be Brought to the Attention of EPA and the Appropriate Plaintiff/Intervenor

None

Paragraph 112 SUPPLEMENTAL AND COMMUNITY ENVIRONMENTAL PROJECTS (SCEP) AND STATE AND LOCAL ENVIRONMENTALLY BENEFICIAL PROJECTS (SLEBP) in Section VIII with Certification

I. Progress Report for Each SCEP or SLEBP (section VIII)

Paragraph 104: In progress

Paragraph 105: Complete

Paragraph 106: Complete

Paragraph 107: Complete

Paragraph 108: Complete

Paragraph 109: Complete

II. Completed SCEP or SLEBP (section VIII)

A. Detailed Description of Each SCEP or SLEBP Project as Implemented

None

B. Brief Description of Any Significant Operating Problems Encountered

None

C. Certification That Each Project Has Been Fully Implemented Pursuant to the Provisions of this Consent Decree

See the certification behind the cover letter.

D. Description of the Environmental and Public Health Benefits Resulting

From Implementation of Each Project (including quantification of the benefits and pollutant reductions, where practicable)

N/A

APPENDIX VI

Toledo

Hydrocarbon Flaring Incident – April 29, 2010

Root Cause Failure Analysis



Investigation Report for Acid Gas Flaring, Hydrocarbon Flaring or Tail Gas Incidents Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	06/09/2010		Incident Type (Check one)	Acid Gas Flaring: <input type="checkbox"/>
Agency Report #	1004-48-1122			Tail Gas Incident: <input type="checkbox"/>
Date(s) of Incident:	(Beginning)	(End)	1st Flaring start/end time:	4/29/10 16:45 – 19:39
	04/29/2010	04/29/2010	2nd Flaring start/end time:	4/30/10 07:20 – 13:17
			3rd Flaring start/end time:	
Amount of SO_2 Released:	See attached Form	Pounds <input type="checkbox"/>	Location at the Toledo Refinery:	Plant 4 Flare <input checked="" type="checkbox"/>
		Tons <input checked="" type="checkbox"/>		Plant 9 Flare <input type="checkbox"/>
	2.6			SRU Incinerator Stack <input type="checkbox"/>

Incident Description:

The refinery operates two saturate gas compressors known as C-402 and C-416. Though each is capable of operating independently under certain conditions, the compressors are operated in parallel during typical operating conditions. On 29-Apr-10, the compressors were operating in tandem. At approximately 16:45 that day, C-402 experienced abnormally high cylinder temperature. To avoid the potential for metallurgical damage to the compressor, C-402 was manually shutdown while C-416 continued to operate. Shortly thereafter, however, C-416 began to over speed, tripping an automatic mechanical shutdown. As a result of that trip, C-402, which had since been allowed to cool, was restarted and ran overnight as of 19:20 29-Apr-10.

On 30-Apr-10 at approximately 08:15, C-402 began to over speed, tripping an automatic mechanical shutdown. After extensive troubleshooting and multiple restart attempts, Sunoco determined that neither compressor, C402 or C-416, could run reliably at that time. Accordingly, the refinery saturate gas was routed to the FCC wet gas compressor known as C-421, and the flare valves were closed as of 13:17 30-Apr-10 ending the flaring incident. Both C-416 and C-402 were removed from service for repair.

Steps taken to limit duration of flaring or quantity of SO_2 /Hydrocarbon released (Corrective Actions):

To minimize the quantity of SO_2 released during the flaring incident, operations adjusted refinery processes to decrease production of refinery saturate gas, including increasing crude tower operating pressure. Also, the FCC feed rate was decreased to allow the FCC C-421 compressor to accommodate saturate gas that would have been compressed by C-416 and C-402.

Root Cause of Incident:

The saturate gas compressors (C-402 & C416) were manually and mechanically shutdown during the incident due to over heating (as well as consequential overspeeding which followed the overheating shutdown). The cause of the overheating is believed to be carryover accumulation which could have contributed to coke formation in the compressor valves and the resulting temperature increases.

Contributing Causes of Incident:

N/A

Preventive Actions (Actions to reduce likelihood of Recurrence):

- Implement a procedure to drain the compressor suction line daily to avoid carryover accumulation and reduce the opportunity for coke formation and resulting temperature increases in the cylinder.
- Use and evaluate a compressor daily temperature log to confirm that the daily suction line draining is effectively controlling the temperature buildup
- Optimize procedures to route refinery saturate gas to the C-421 FCC wet gas compressor more quickly when an issue arises at C-402 & C416 in an effort to avoid any resulting hydrocarbon flaring incident.

Do Stipulated Penalties Apply?

YES

☐

NO

☒**If YES explain:**

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐Completed: ☒Not Completed: ☐

Explain:

Approval Section

Title	Print Name	Signature	Date
Operations Manager:	J. Parsil	Original signed by JCP	6/14/2010
Environmental Manager:	L. Balogh per E. Moore DOA	Original signed by LAB	6/11/2010

Date of Incident:	04/29/2010	Incident Type	Acid Gas Flaring: <input type="checkbox"/>
Agency Report #	1004-48-1122	(Check one)	Hydrocarbon Flaring <input checked="" type="checkbox"/>
			Tail Gas Incident: <input type="checkbox"/>

Calculation of Quantity of SO₂ Released from Gas Flaring (Round to the nearest 0.1 Tons):
Tons of SO₂ = [FR][TD][ConcH₂S][8.44x10⁻⁵] (See p. 52 of 114 CD)
FR = Average Flow Rate of Gas During Flaring Incident in scfh
TD = Total Duration of Flaring Incident in hours
ConcH₂S = Average Concentration of Hydrogen sulfide in gas during flaring incident
8.44x10⁻⁵ = [lb mole H₂S/379 scf H₂S][64 lbs SO₂/lb mole H₂S][1 Ton/2000 lbs]

Reason for any missing data: No data missing
Basis for any data that was estimated: Flows were estimated based on process operating conditions during the release. Concentrations were based on the unit design.

Release No. 1:
 $[(379,000 \text{ scfh}) \times (2.4 \text{ hrs}) \times (0.011 \text{ mol H}_2\text{S/mol gas}) \times (8.44\text{E-}05)] = 0.8 \text{ tons (1,600 lb)}$

Release No. 2:
 $[(342,000 \text{ scfh}) \times (5.6 \text{ hrs}) \times (0.011 \text{ mol H}_2\text{S/mol gas}) \times (8.44\text{E-}05)] = 1.8 \text{ tons (3,560 lb)}$

Release No. 3: NA

Tons of SO₂ = 2.6 tons total SO₂ released

Rate of SO₂ Emissions During Gas Flaring: ER = [FR][ConcH₂S][0.169]
ER = Emission Rate in pounds of SO₂ per hour
Pounds per hour of SO₂ = [FR][ConcH₂S][0.169] (See p. 52 of 114 CD)
FR = Flow Rate of Gas During Flaring Incident in scfh
ConcH₂S = Average Concentration of Hydrogen sulfide in gas during flaring incident
0.169 = [lb mole H₂S/379 scf H₂S][1.0 lb mole SO₂/1 lb mole H₂S][64 lbs SO₂/lb mole SO₂]

Reason for any missing data: No data missing
Basis for any data that was estimated: Flows were estimated based on process operating conditions during the release. Concentrations were based on the unit design.

Emission Rate of SO₂

Release No. 1: ER = : $[379,000 \text{ scfh}] [0.011 \text{ mol H}_2\text{S/mol gas}] [0.169] = 705 \text{ lb SO}_2/\text{hr}$

Release No. 2: ER = : $[342,000 \text{ scfh}] [0.011 \text{ mol H}_2\text{S/mol gas}] [0.169] = 636 \text{ lb SO}_2/\text{hr}$

Comments:

	Name	Title	Date
Calculation Performed by:	L. Balogh	Lead Env. Eng.	06/07/2010
Calculation Reviewed by:	E. Moore	Env. Manager	06/11/2010

APPENDIX VII

Toledo

Hydrocarbon Flaring Incident – May 12, 2010
Root Cause Failure Analysis



Investigation Report for Acid Gas Flaring, Hydrocarbon Flaring or Tail Gas Incidents Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	06/24/2010		Incident Type (Check one)	Acid Gas Flaring:	<input type="checkbox"/>
Agency Report #	1005-48-1269			Tail Gas Incident:	<input type="checkbox"/>
Date(s) of Incident:	(Beginning)	(End)	1 st Flaring start/end time:	05/12/10 12:30 – 12:59	
	05/12/2010	05/12/2010	2 nd Flaring start/end time:	05/12/10 15:08 – 15:40	
			3 rd Flaring start/end time:		
Amount of SO_2 Released:	See attached Form	Pounds <input type="checkbox"/>	Location at the Toledo Refinery:	Plant 4 Flare	<input checked="" type="checkbox"/>
	0.3	Tons <input checked="" type="checkbox"/>		Plant 9 Flare	<input type="checkbox"/>
				SRU Incinerator Stack	<input type="checkbox"/>

Incident Description:

This incident was the result of two unrelated events. The first event occurred at approximately 12:30 12-May-10 during the attempted restart of a compressor that had been shut down for repair. When gas was initially routed to the compressor during the attempted start up, the valves to flare opened. Once refinery operating personnel determined that the compressor would not restart, the start up attempt was aborted and the flaring ended by 12:58 12-May-10.

The second event began at approximately 15:08 12-May-10. Refinery operating personnel were attempting to change a pressure gauge. In order to change the gauge, the affected control valve had to be set manually. During that process, a different control valve was inadvertently placed in manual. As a result, the control valve that should have been in manual opened automatically when the pressure gauge was removed. The refinery was unable to process the gas and the excess vented to the flare as designed. The operators immediately closed the control valve and gas venting to the flare ended by 15:38 12-May-10, ending the release from the Plant 4 flare.

Steps taken to limit duration of flaring or quantity of SO_2 /Hydrocarbon released (Corrective Actions):

To minimize the quantity of SO_2 released during the flaring incident, operations adjusted refinery processes to decrease production of refinery saturate gas, including increasing crude tower operating pressure. Also, once operators realized they had placed the wrong control valve in manual, they took immediate corrective action.

Root Cause of Incident:

It was determined that the compressor did not start because the suction pressure was too high. While the compressor was being repaired, the gas that would have normally been processed was rerouted to a higher pressure system. In order to minimize emissions, the refinery tried to restart at a slightly higher suction pressure but the attempt was not successful. This was the root cause of the first event. The second flaring event occurred when refinery personnel was performing maintenance on a pressure gauge in order to assure that the readings were correct for another restart attempt. The root cause for that flaring event was equipment misidentification during maintenance activity.

Contributing Causes of Incident:

N/A

Preventive Actions (Actions to reduce likelihood of Recurrence):

- The compressor start up procedure was modified to ensure the suction pressure was between 3 and 3.5 psig before a start up attempt.
- The incident and root causes were reviewed with the affected refinery operators with emphasis placed on proper communication and valve identification.

Do Stipulated Penalties Apply?

YES

☐

NO

☒

If YES explain:

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐

Completed: ☒

Not Completed: ☐

Explain:

Approval Section

Title	Print Name	Signature	Date
Operations Manager:	J. Parsil	Original signed by JCP	6/25/2010
Environmental Manager:	E. Moore	Original signed by EMM	6/24/2010

Date of Incident:	05/12/2010	Incident Type	Acid Gas Flaring:	<input type="checkbox"/>
Agency Report #	1005-48-1269	(Check one)	Hydrocarbon Flaring	<input checked="" type="checkbox"/>
			Tail Gas Incident:	<input type="checkbox"/>

Calculation of Quantity of SO₂ Released from Gas Flaring (Round to the nearest 0.1 Tons):
Tons of SO₂ = [FR][TD][ConcH₂S][8.44x10⁻⁵] (See p. 52 of 114 CD)
FR = Average Flow Rate of Gas During Flaring Incident in scfh
TD = Total Duration of Flaring Incident in hours
ConcH₂S = Average Concentration of Hydrogen sulfide in gas during flaring incident
8.44x10⁻⁵ = [lb mole H₂S/379 scf H₂S][64 lbs SO₂/lb mole H₂S][1 Ton/2000 lbs]

Reason for any missing data: No data missing
Basis for any data that was estimated: Flows were estimated based on process operating conditions during the release. Concentrations were based on the unit design.

Release No. 1:
[(409,000 scfh)*(0.49 hrs)*(0.011 mol H₂S/mol gas)*(8.44E-05)] = 0.19 tons (370 lb)

Release No. 2:
[(238,000 scfh)*(0.53 hrs)*(0.01 mol H₂S/mol gas)*(8.44E-05)] = 0.11 tons (210 lb)

Release No. 3: NA

Tons of SO₂ = 0.3 ton total SO₂ released

Rate of SO₂ Emissions During Gas Flaring: ER = [FR][ConcH₂S][0.169]
ER = Emission Rate in pounds of SO₂ per hour
Pounds per hour of SO₂ = [FR][ConcH₂S][0.169] (See p. 52 of 114 CD)
FR = Flow Rate of Gas During Flaring Incident in scfh
ConcH₂S = Average Concentration of Hydrogen sulfide in gas during flaring incident
0.169 = [lb mole H₂S/379 scf H₂S][1.0 lb mole SO₂/1 lb mole H₂S][64 lbs SO₂/lb mole SO₂]

Reason for any missing data: No data missing
Basis for any data that was estimated: Flows were estimated based on process operating conditions during the release. Concentrations were based on the unit design.

Emission Rate of SO₂

Release No. 1: ER = : [409,000 scfh][0.011 mol H₂S/mol gas][0.169] = 760 lb SO₂/hr

Release No. 2: ER = : [238,000 scfh][0.01 mol H₂S/mol gas][0.169] = 402 lb SO₂/hr

Comments:

	Name	Title	Date
Calculation Performed by:	L. Balogh	Lead Env. Eng.	06/24/2010
Calculation Reviewed by:	E. Moore	Env. Manager	06/24/2010

APPENDIX VIII
Toledo
Hydrocarbon Flaring Incident – December 09, 2010
Root Cause Failure Analysis



Investigation Report for Acid Gas Flaring, Hydrocarbon Flaring or Tail Gas Incidents Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	01/28/2010		Incident Type (Check one)	Acid Gas Flaring: <input checked="" type="checkbox"/>
Agency Report #	0912-48-3473 **			Tail Gas Incident: <input type="checkbox"/>
Date(s) of Incident:	(Beginning)	(End)	1st Flaring start/end time:	AG: 12/12/09 12:12 to 12/14/09 14:03
	12/12/2009	12/14/2009	2nd Flaring start/end time:	HC: 12/12/09 10:45 to 12/13/09 20:40
			3rd Flaring start/end time:	
Amount of SO_2 Released:	21.4 See attached Form	Pounds <input type="checkbox"/> Tons <input checked="" type="checkbox"/>	Location at the Toledo Refinery:	Plant 4 Flare <input checked="" type="checkbox"/> Plant 9 Flare <input checked="" type="checkbox"/> SRU Incinerator Stack <input type="checkbox"/>

Incident Description:

(** This report covers emissions from Incidents # 0912-48-3473, 0912-48-3478 and 0912-48-3484)

At approximately 10:45 12-Dec-09, the refinery suffered a loss of electrical power. This resulted in the loss of power to the majority of refinery process units including the FCC Unit and Wet Gas Scrubber, associated CO Boilers, the Amine Unit, and the Hydrocracker. Initially SRU2 shutdown and SRU1 continued to operate until 12:17 12-Dec-09, when hydrocarbon carryover forced the refinery to shutdown SRU1 and divert all acid gas to the Plant 4 flare. At the time of the incident, the substation was covered with melting ice and a phase to phase short occurred. Because of the unplanned shutdown, excess material had to be safely burned at the refinery flares. Since some of the gases sent to the flares contained sulfur, sulfur dioxide was released.

Power was re-established at approximately 12:32 12-Dec-09 and units began the process of restarting. While attempting to restart in the afternoon, a boiler feed water line leak was found which stopped the boiler restart and delayed the refinery restart. Once the line was clamped, the boilers were restarted at 00:35 13-Dec-09 and the refinery restart progressed. The crude units began operation at approximately 10:00 13-Dec-09. The FCC catalyst circulation began at 12:30 and feed was introduced to the unit at approximately 16:30. The amine unit was in circulation and warming up around 02:00 13-Dec-09 in anticipation of the FCC restart. Fuel gas was routed to the amine unit at approx. 18:00 13-Dec-09 for treatment and acid gas was generated for SRU feed. Neither SRU1 nor SRU2 could take feed due to mechanical/operational issues. By 11:45 14-Dec-09, the refinery was able to restart SRU2. The acid gas valve to the Plant 4 Flare was closed at 13:00 and TGTU overhead stripper gas was out of the Plant 4 flare by 14:00 14-Dec-09, ending the release from the Plant 4 flare. (SRU1 remained out of service due to ongoing mechanical issues.)

Steps taken to limit duration of flaring or quantity of SO_2 /Hydrocarbon released (Corrective Actions):

During this period, Sunoco reduced emissions consistent with its OMM, PMOP and PMMAP for the refinery by the use of off shift labor to return the unit to service as quickly as possible, keeping the crude and FCC at minimum operating rates, and keeping the SWS and hydrocracker out of service.

Root Cause of Incident:

The event was initiated by a power failure in a Sunoco substation that was caused by ice build up and subsequent melt off.

Contributing Causes of Incident:

Start up was delayed due to a split in a boiler feed water line. Sunoco could not return SRU1 to service because of a mechanical malfunction and blockage in the unit. Also, an operational/mechanical issue in SRU2/TGTU 2 caused high temperatures in the incinerator while attempting to put hydrogen to the TGTU2 reactor.

Preventive Actions (Actions to reduce likelihood of Recurrence):

- Complete Ring Bus at Substation #2 to include Buses #6 and #7 "Fast Bus Transfer."
- Modify cooling tower operation during environmental conditions that contribute to icing.
- Changed procedures to increase Operations rounds during icing conditions.
- Follow-up with Toledo Edison on reliability considerations and maintenance of equipment in ice related service.

Do Stipulated Penalties Apply?

YES

☐

NO

☒**If YES explain:**

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐ **Completed:** ☐ **Not Completed:** ☒ **Explain:**

- Project to install Ring Bus at Substation #2, including Buses #6 and #7 "Fast Bus Transfer," is scheduled to be completed during March 2010 Turnaround.
- All other actions have been completed.

Approval Section

Title	Print Name	Signature	Date
Operations Manager:	J. Parsil	Original signed by JCP	1/29/2010
Environmental Manager:	E. Moore	Original signed by EMM	1/29/2010

Date of Incident:	12/12/2009	Incident Type	Acid Gas Flaring: <input checked="" type="checkbox"/>
Agency Report #	0912-48-3473	(Check one)	Hydrocarbon Flaring <input checked="" type="checkbox"/>
			Tail Gas Incident: <input type="checkbox"/>

Calculation of Quantity of SO₂ Released from Gas Flaring (Round to the nearest 0.1 Tons):
Tons of SO₂ = [FR][TD][ConcH₂S][8.44x10⁻⁵] (See p. 52 of 114 CD)
FR = Average Flow Rate of Gas During Flaring Incident in scfh
TD = Total Duration of Flaring Incident in hours
ConcH₂S = Average Concentration of Hydrogen sulfide in gas during flaring incident
8.44x10⁻⁵ = [lb mole H₂S/379 scf H₂S][64 lbs SO₂/lb mole H₂S][1 Ton/2000 lbs]

Reason for any missing data: No data missing
Basis for any data that was estimated: Flows were estimated based on valve design data and process operating conditions during release. Concentrations were based on the most recent available lab data and knowledge of the gas being flared.

Release No. 1: Acid Gas Flaring
[(133 scfh)*(28.5 hrs)*(0.76 mol H₂S/mol gas)*(8.44E-05) +
(12,898 scfh)*(20.4 hrs)*(0.76 mol H₂S/mol gas)*(8.44E-05) +
(5,195 scfh)*(22.2 hrs)*(0.30 mol H₂S/mol gas)*(8.44E-05)] = 20.0 tons (40,069 lb)

Release No. 2: Hydrocarbon Flaring
[(187,750 scfh)*(3.25 hrs)*(0.003 mol H₂S/mol gas)*(8.44E-05) +
(74,691 scfh)*(34 hrs)*(0.006 mol H₂S/mol gas)*(8.44E-05) = 1.44 tons (2,880 lb)

Release No. 3: NA

Tons of SO₂ = 21.4 tons total SO₂ released

Rate of SO₂ Emissions During Gas Flaring: ER = [FR][ConcH₂S][0.169]
ER = Emission Rate in pounds of SO₂ per hour
Pounds per hour of SO₂ = [FR][ConcH₂S][0.169] (See p. 52 of 114 CD)
FR = Flow Rate of Gas During Flaring Incident in scfh
ConcH₂S = Average Concentration of Hydrogen sulfide in gas during flaring incident
0.169 = [lb mole H₂S/379 scf H₂S][1.0 lb mole SO₂/1 lb mole H₂S][64 lbs SO₂/lb mole SO₂]

Reason for any missing data: No data missing
Basis for any data that was estimated: Flows were estimated based on valve design data and process operating conditions during release. Concentrations were based on the most recent available lab data and knowledge of the gas being flared.

Emission Rate of SO₂

Release No. 1: ER = : 40,069 lb SO₂ / 49.9 hrs = 803 lb SO₂/hr

Release No. 2: ER = : 2,880 lb SO₂ / 34 hrs = 84 lb SO₂/hr

Comments:

	Name	Title	Date
Calculation Performed by:	L. Balogh	Lead Env. Eng.	01/28/2010
Calculation Reviewed by:	E. Moore	Env. Manager	01/29/2010